

1966 OPERATING SUMMARY

KINGSTON

**water pollution
control plant**

TD
227
K56
K56
1966
MDE
c.1
a aa

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at copyright@ontario.ca



ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

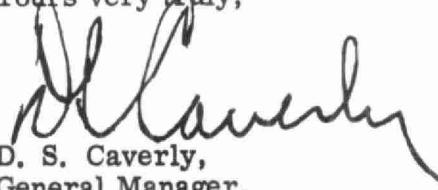
Members of the Kingston Local Advisory Committee,
Township of Kingston.

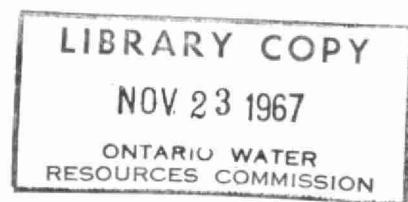
Gentlemen:

We are pleased to submit to you the 1966 Operating Summary for the
Kingston Township Water Pollution Control Plant, OWRC Project No.
61-S-98.

It is hoped that our joint participation in efforts to combat water pollution
will have even more success in the coming year.

Yours very truly,


D. S. Caverly,
General Manager.





ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am happy to present you with the 1966 Operating Summary for the Kingston Township Water Pollution Control Plant, OWRC Project No. 61-S-98.

The report offers a concise summary of operating data for the year and comparisons with previous years where these are applicable and significant.

Yours very truly,

A handwritten signature in cursive ink that reads "B. C. Palmer".

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

TD
227
KS6
KS6
1966
MOB

atgu

FOREWORD

• This operating summary contains complete information on the management of the project during 1966. It contains a concise review of the year's plant operation, significant financial details, and a visual presentation in graphs and charts of technical performance.

The information will be of value to interested parties in assessing the adequacy of the project at this time and its ability to meet future requirements.

The report is the result of co-operation by several groups within the Division of Plant Operations. These include the statistics section and the technical publications section. The Division of Finance and the draughting section of the Division of Sanitary Engineering were also closely associated with its publication.

The Regional Operations Engineer, however, has had the primary responsibility for the content, and will be happy to answer any questions regarding it.

CONTENTS

Foreword	1
Title Page	3
'66 Review	4
Project Costs	6
Operating Costs	7
Process Data	9
Recommendations	Inside back cover



Environment Ontario
Laboratory Library
125 Resources Rd.
Etobicoke, Ontario M9P 3V6
Canada

KINGSTON
water pollution control plant
operated for

THE TOWNSHIP OF KINGSTON

by the

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN: Dr. James A. Vance

VICE-CHAIRMAN: J. H. H. Root, M.P.P.

COMMISSIONERS

W. D. Conklin	H. E. Brown
D. A. Moodie	L. E. Venchiarutti

GENERAL MANAGER: D. S. Caverly

ASSISTANT GENERAL MANAGERS

L. E. Owers	K. H. Sharpe
F. A. Voege	A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director:	C. W. Perry
Regional Supervisor:	D. A. McTavish
Operations Engineer:	J. N. Dick

801 Bay Street Toronto 5

'66 REVIEW

In 1966, the Township of Kingston Water Pollution Control Plant treated a total of 186,700,000 gallons of waste. This represents an average daily flow of 510,000 gallons, a slight increase over the 1965 average daily flow of 496,000 gallons.

The operating costs of the treatment plant and the associated pumping stations in 1966 were \$25,674.25. The cost of treating one million gallons of sewage in 1966 was \$137.52. The operating costs in 1966 increased by approximately \$2,000 from those of the previous year, primarily due to higher salaries, increased power and more repairs and maintenance at the plant and pumping stations.

The average concentrations of BOD and suspended solids in the influent to the plant were 208 ppm and 219 ppm respectively. The BOD and suspended solids in the plant effluent were 21 ppm and 19 ppm respectively. This represents a percent reduction in BOD of 90 and a percent reduction in suspended solids of 91.5. These are good reductions for an activated sludge treatment plant. The concentration of the waste is indicative of a normal domestic sewage.

The pumping efficiency of the Day's Road Pumping Station was increased in 1966 due to the installation of proper wearing rings in the pump volute. This increased the capacity of the pumps by approximately 35 percent. Some difficulties were experienced at the Day's Road Pumping Station due to the septic tank contents that were dumped into the sewer. This caused

the water filter to become plugged and the seal to overheat. The seal broke under these conditions, and flooded the pumping station with approximately two feet of sewage.

The plant also ran into trouble for a part of the year while attempting to treat some HMD and spin-finish waste from the Dupont Chemical Company Ltd. On several occasions the sewage contained a considerable amount of nylon waste which jammed and broke the barminutor.

In December, 1966, the pilot gas line to the waste burner broke and had to be corrected by a contractor. In the course of this the contractor further damaged the telephone lines and the power lines leading to the plant.

The drive shafts on both blowers broke within a period of several days in November. This left the plant without any aeration facilities whatsoever. Using the services of a local machine shop, one shaft was repaired and the plant was back in operation within 48 hours.

The cleaning and maintenance of the pumping station was made considerably easier in 1966 due to the acquisition of a half-ton pick-up truck.

In 1966, a Local Advisory Committee Meeting was held in the Council Chambers to discuss the problem of high flows and flooding in the Day's Road Pumping Station. Because of this condition and the possibility of further development in the area contributing to this station, it was felt that an engineering report was necessary to review the growth rate in the township. The engineering firm of R. V. Anderson & Associates Ltd. were engaged to prepare this report, and the cost was to be covered from the Reserve For Contingencies Fund. The report, however, was not completed by the end of 1966.

The plant was inspected routinely by head office engineers and technicians and found to be in a clean and satisfactory condition.

PROJECT COSTS

NET CAPITAL COST (Estimated)	\$1,534,517.15
DEDUCT - Portion Financed by CMHC (Estimated)	\$431,721.56
- Payments from Municipalities	<u>156,782.00</u>
	<u>588,503.56</u>
Long Term Debt to OWRC	<u>\$ 946,013.59</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1966	-
Net Operating	\$ 25,674.25
Debt Retirement	-
Reserve	9,988.66
Interest Charged	52,101.39
 TOTAL	 <u>\$ 87,764.30</u>

RESERVE ACCOUNT

Balance at January 1, 1966	\$ 22,492.34
Deposited by Municipality	9,988.66
Interest Earned	<u>1,290.83</u>
	\$ 33,771.83
Less Expenditures	<u>4,731.76</u>
Balance at December 31, 1966	<u>\$ 29,040.07</u>

MONTHLY OPERATING COSTS

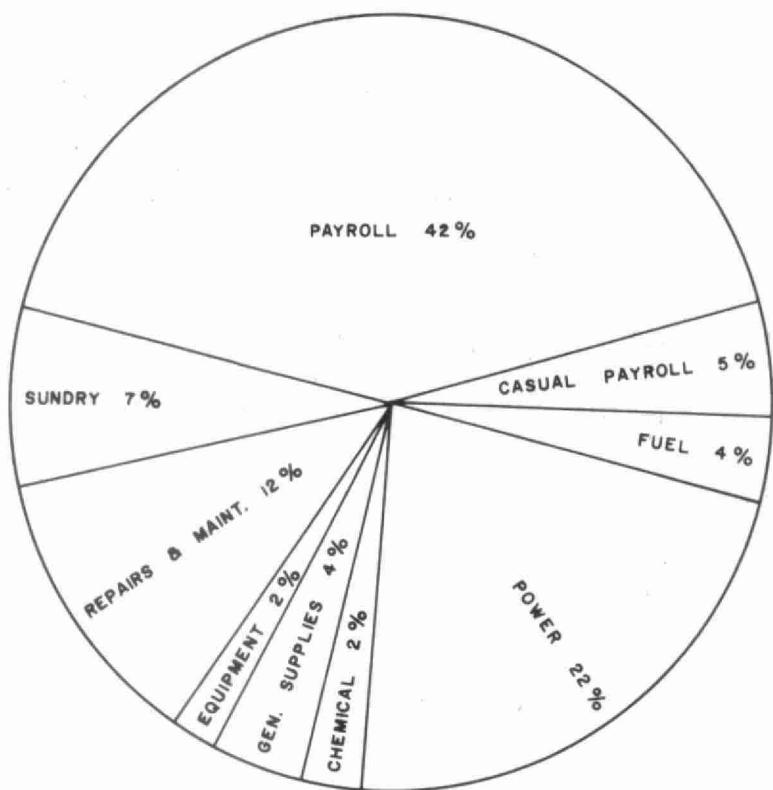
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDAY
JAN	1563.69	794.74	60.80	104.37	453.67		28.48	64.88		56.75
FEB	1685.47	734.90	121.60	103.64	448.49		123.73		103.03	50.08
MARCH	1951.31	759.38	54.72	220.90	484.53		31.61	4.70	312.94	82.53
APRIL	3521.49	1166.13	114.00	223.04	448.31	228.38	57.47		523.46	700.70
MAY	1987.75	890.26	36.48		498.75		45.25	101.72	298.62	116.67
JUNE	2021.79	883.82	114.00		472.55		186.60	1.70	198.68	164.44
JULY	1963.13	796.23	252.42		457.23	228.38	78.85		85.08	64.94
AUG	2212.20	858.20	243.44	79.23	463.30		73.54	221.91	244.66	27.92
SEPT	2180.22	1257.52	96.60		562.55	(22.84)	79.94	129.75	8.26	68.42
OCT	1816.96	854.69	42.02		474.22		89.64		66.49	289.90
NOV	2434.34	870.51	33.18	117.60	530.62	228.38	88.75	1.16	478.68	85.46
DEC	2335.90	917.67	12.00	95.55	437.85		53.73		699.66	119.44
TOTAL	25674.25	10764.05	1181.26	944.33	5732.07	662.30	937.59	525.82	3019.58	1887.25

* SUNDAY INCLUDES SLUDGE HAULING COSTS WHICH WERE NIL

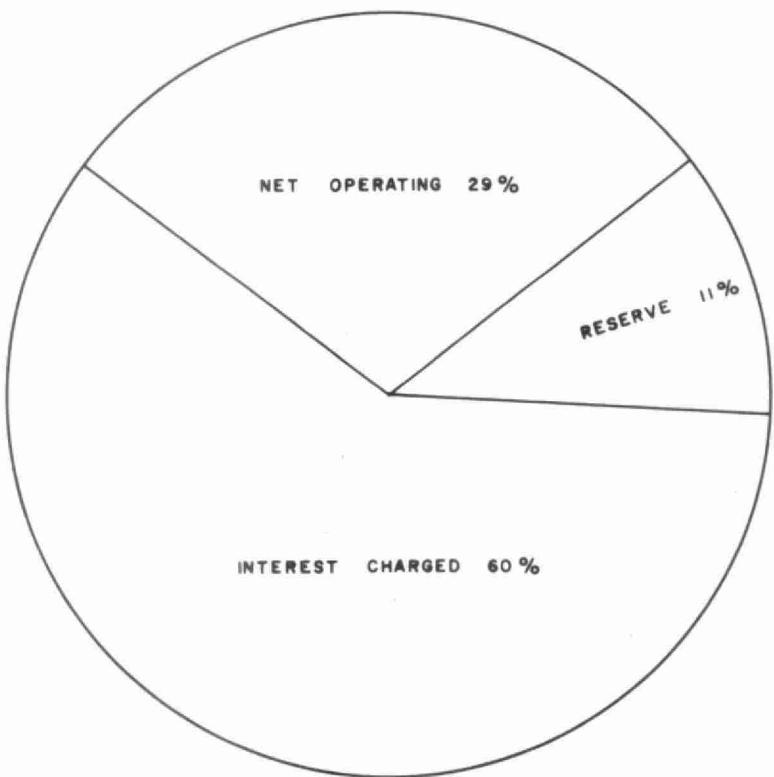
YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1964	111,630	\$23,296.77	\$214.34	43½ CENTS
1965	181,105	\$23,348.09	\$128.92	10 CENTS
1966	186,699	\$25,674.25	\$137.52	7 CENTS

1966 OPERATING COSTS



TOTAL ANNUAL COST



Process Data

PROBABILITY OF FLOWS

From the probability of daily flows graph it should be noted that the 1965 and 1966 graphs are very similar. The flows to the plant exceeded approximately 750,000 gpd 10 percent of the time. This is well below the design capacity of 1 million gpd.

DAILY FLOW GRAPH

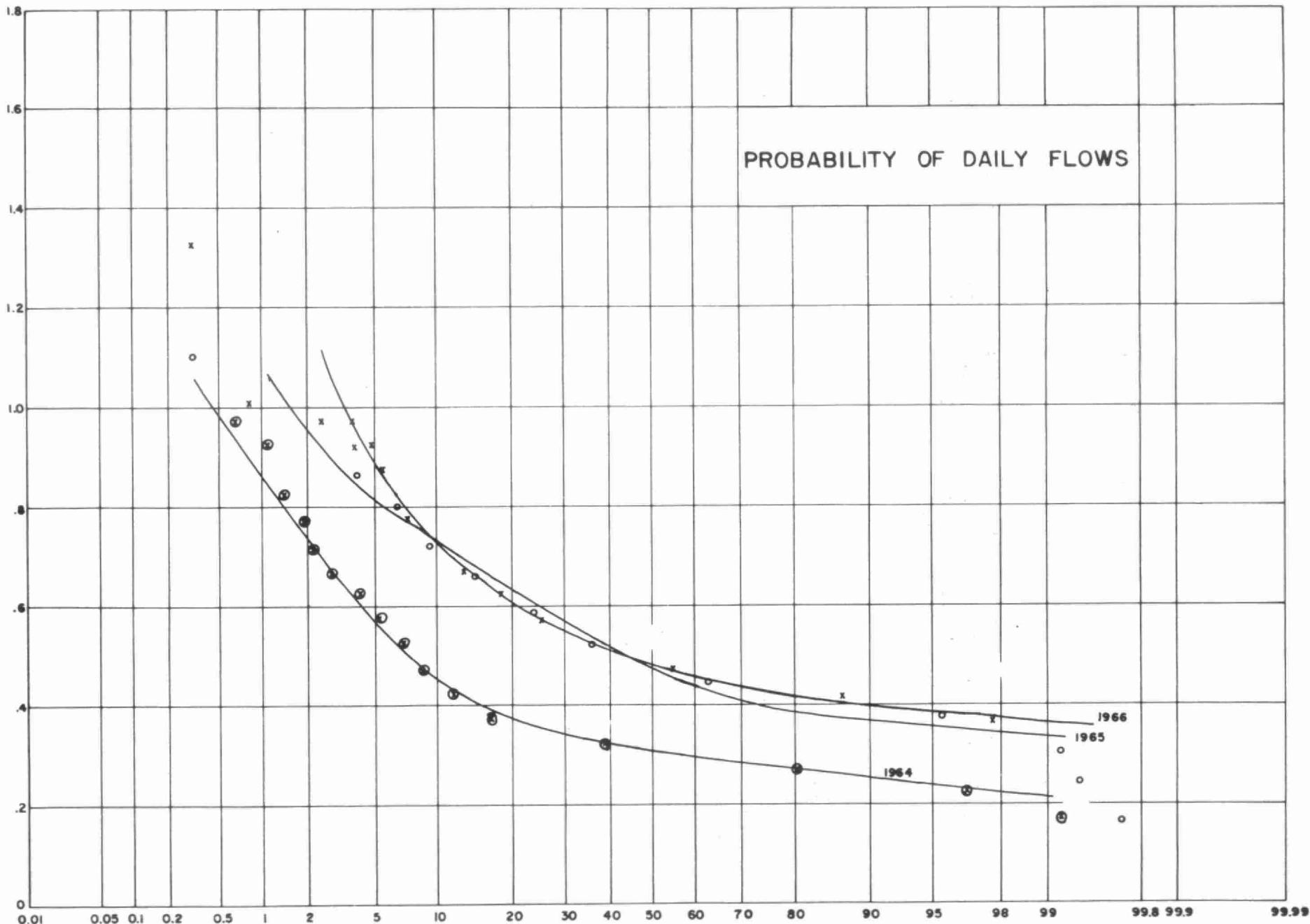
The daily flow graph showed that high flows were received at the plant in February and March of 1966. Another peak occurred in September.

10

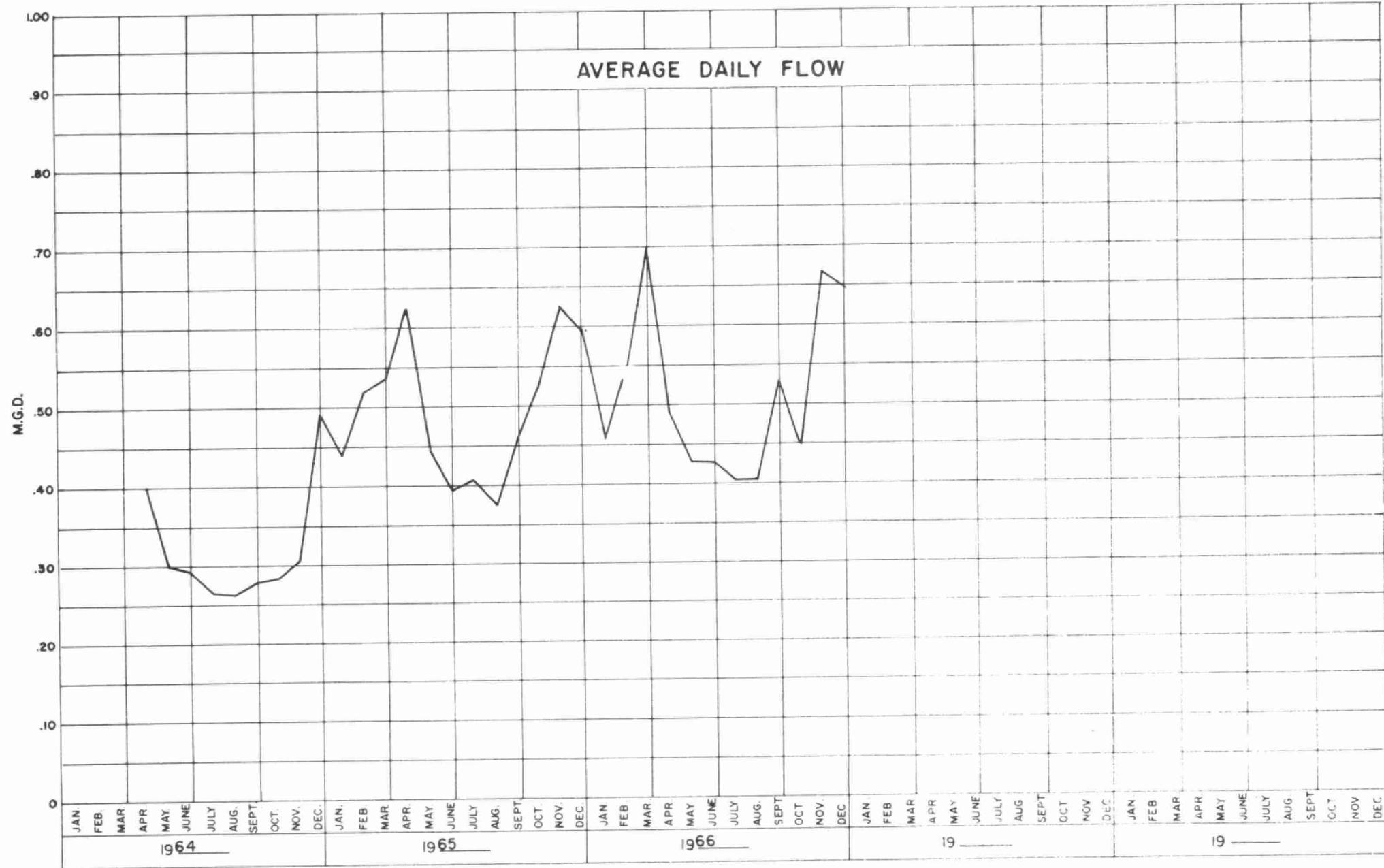
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0

PROBABILITY OF DAILY FLOWS

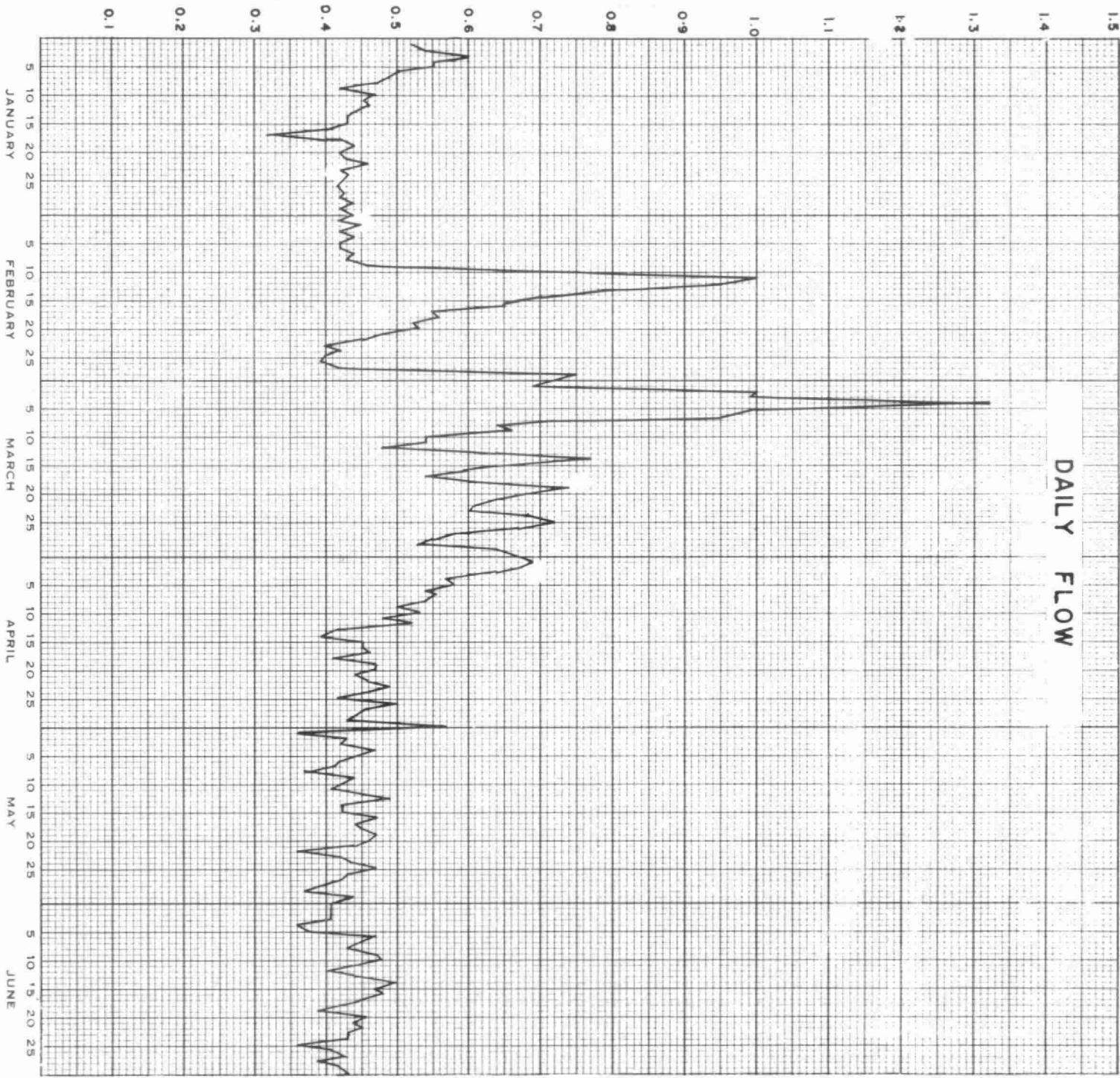
MILLION GALLONS PER DAY

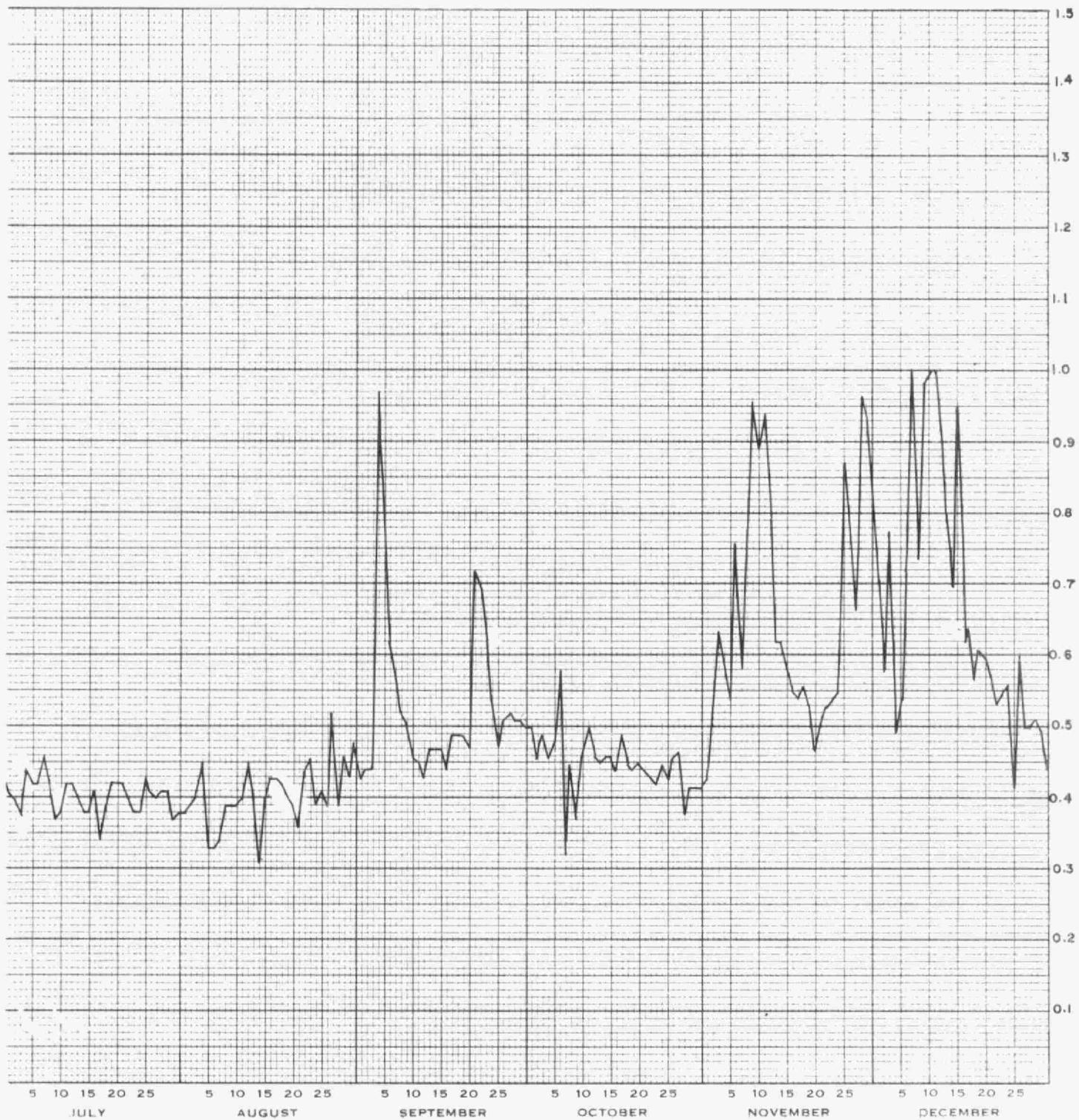


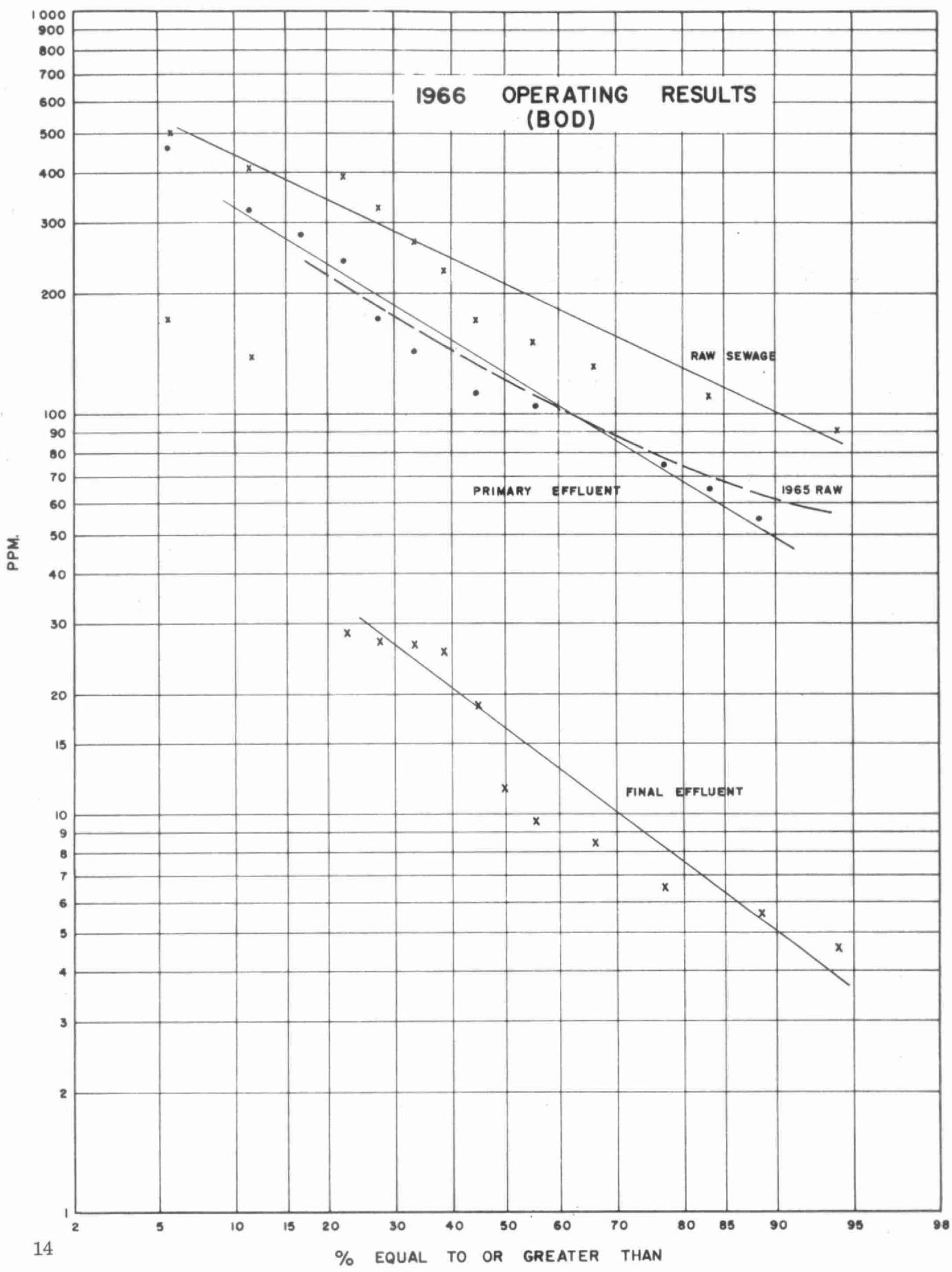
AVERAGE DAILY FLOW

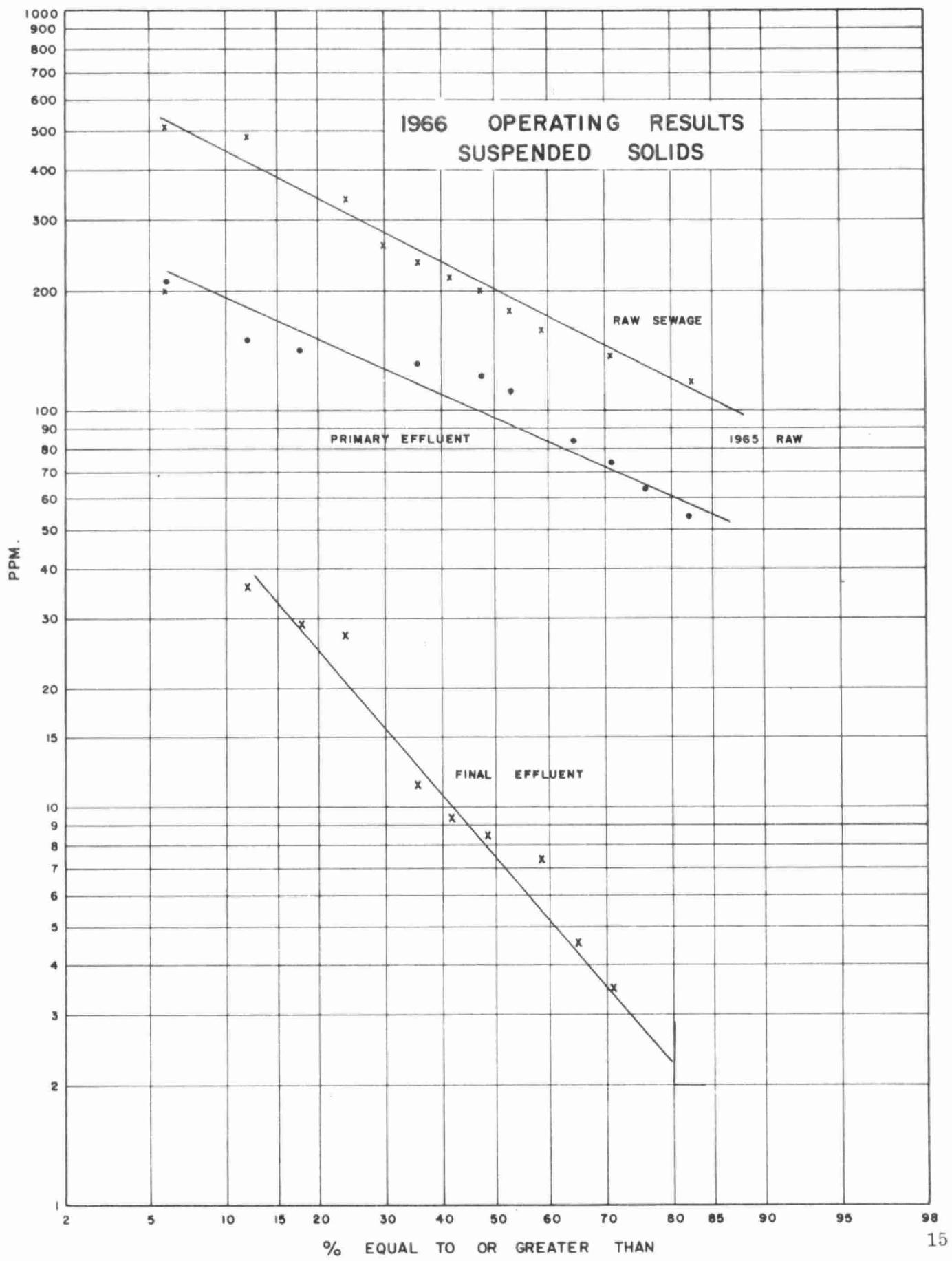


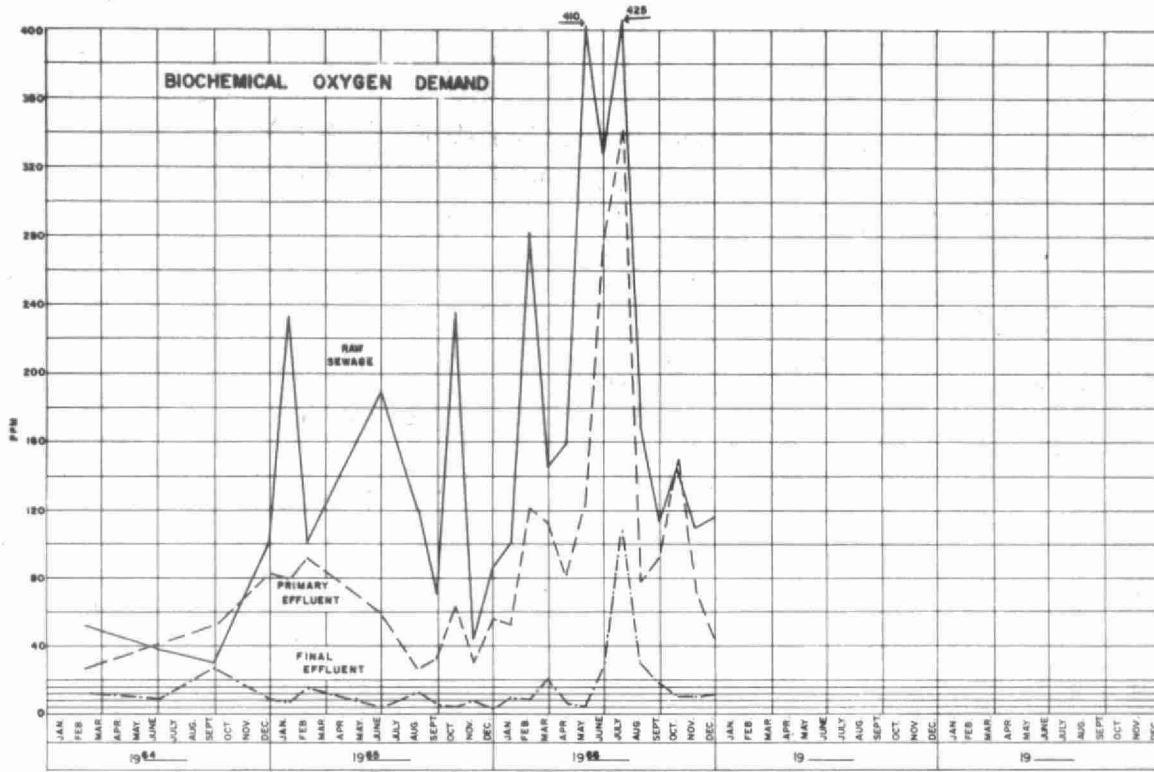
MILLIONS OF GALLONS PER DAY



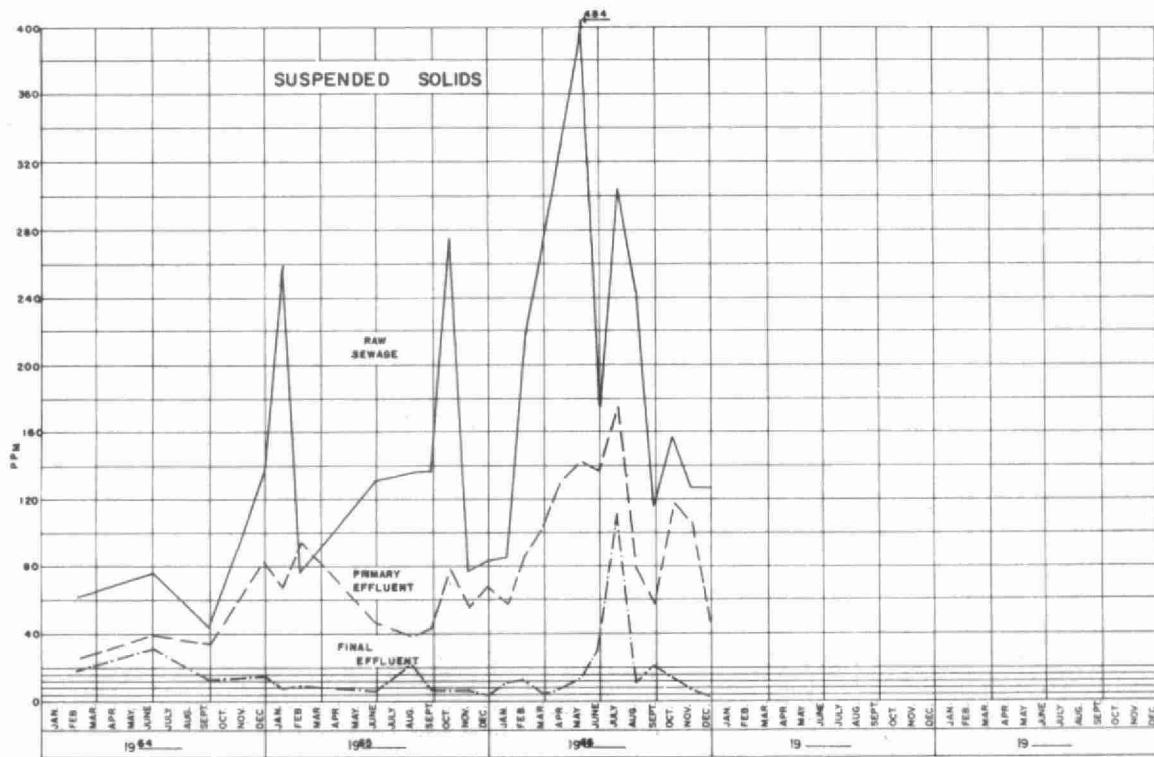








MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

(King)

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	90	9	90.0	5.7	84	8	90.5	5.3	7
FEB.	280	6	97.5	20.8	218	10	95.5	15.8	21
MAR.	145	18	87.0	13.6	272	3	99.0	29.1	28
APR.	160	6	96.5	11.3	336	5	98.5	24.3	24
MAY	410	3	99.5	27.0	484	12	97.5	31.3	16
JUNE	330	26	92.0	19.5	171	29	83.0	9.1	34
JULY	425	110	74.0	19.6	307	110	64.0	12.3	7
AUG.	170	28	83.5	8.9	244	9	88.5	14.7	13
SEPT.	112	16	85.5	7.6	116	19	83.5	7.7	22
OCT.	145	9	93.5	9.5	146	12	92.0	9.3	25
NOV.	109	9	91.5	10.0	126	5	96.0	12.1	36
DEC.	115	10	91.5	10.6	125	1	99.5	12.5	26
TOTAL	-	-	-	174.6	-	-	-	186.7	259
AVG.	208	21	90.0	14.6	219	19	91.5	15.6	22

COMMENTS

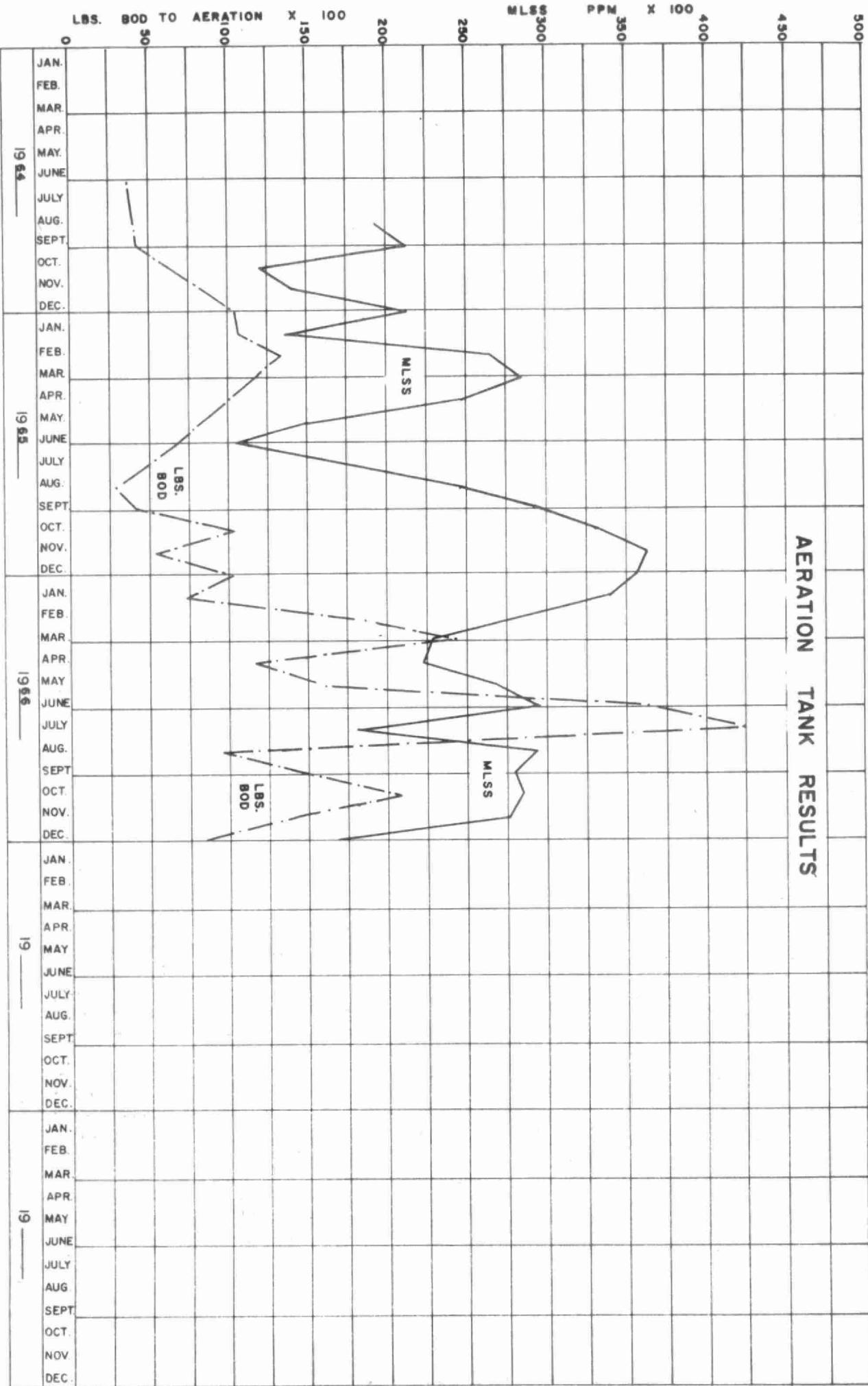
The average concentration of BOD and suspended solids in the influent were 208 ppm and 219 ppm. These samples were obtained from 12, eight-hour composite samples collected at the Kingston WPCP and sent to the laboratory in Toronto for analysis.

It is interesting to note that the concentration of BOD and suspended solids in the plant influent increased considerably in 1966 from that of 1965. The plant effluent contained a BOD and suspended solids concentration of 21 and 19 ppm respectively. This was a percent reduction in BOD and suspended solids of 90 and 91.5 respectively.

A total of 175 tons of BOD was removed from the waste in 1966, and a total of 187 tons of solids were removed.

The amount of grit removed from the waste averaged 22 cubic feet per month. This would appear somewhat high considering that the sewers in the Township carry strictly a domestic sewage.

AERATION TANK RESULTS



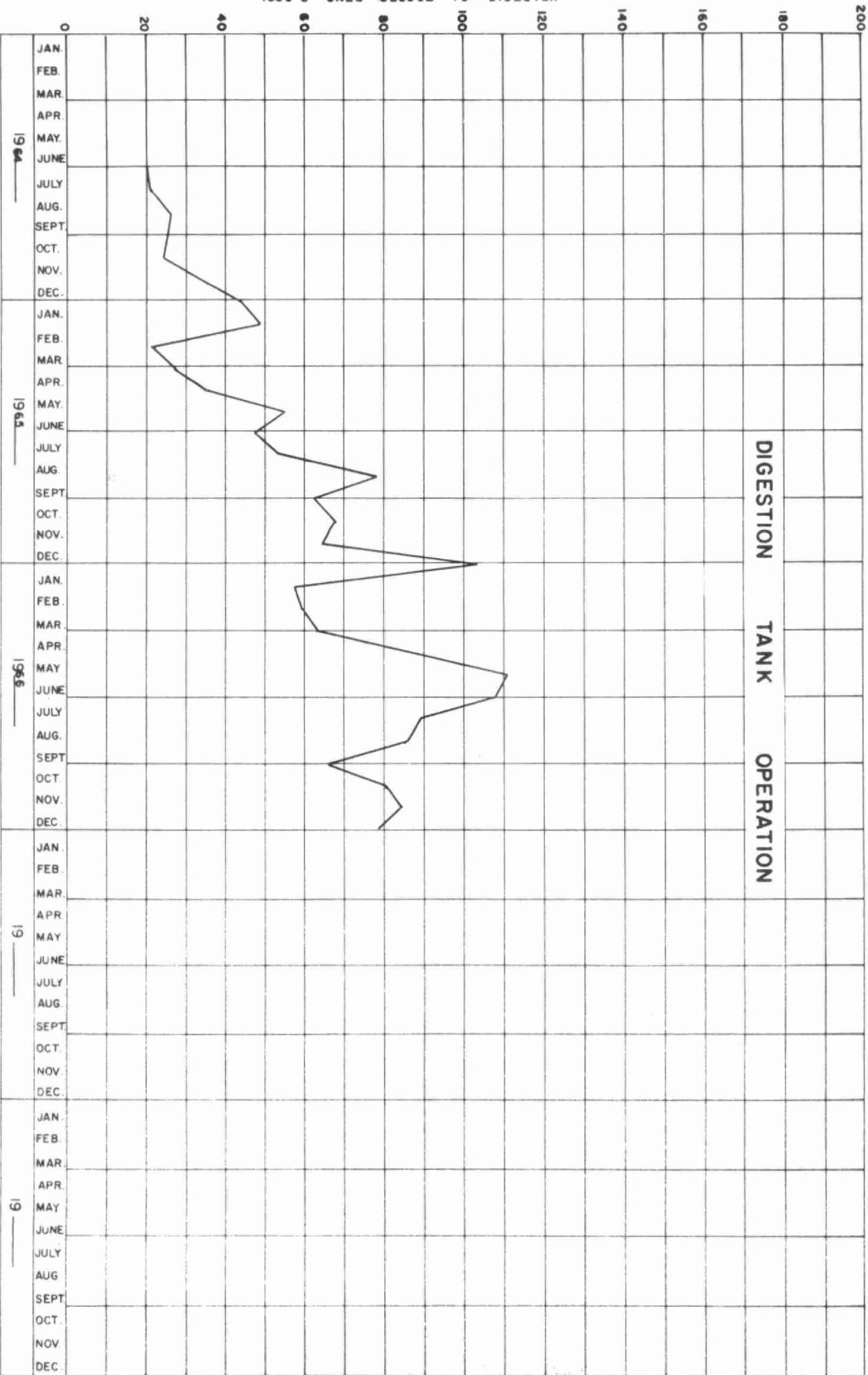
AERATION SECTION

MONTH	PRIM. EFFL B.O.D. PPM.	MLSS. PPM.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	52	3386	3	5897
FEBRUARY	120	2868	9	1870
MARCH	112	2258	13	1769
APRIL	78	2232	7	5944
MAY	120	2674	7	3585
JUNE	280	2952	16	1052
JULY	343	1800	29	1372
AUGUST	76	2938	4	6840
SEPTEMBER	92	2789	6	3865
OCTOBER	150	2848	9	2449
NOVEMBER	70	2759	6	3799
DECEMBER	42	1661	6	7380
TOTAL	-	-	-	-
AVERAGE	128	2597	10	3818

COMMENTS

The average mixed liquor suspended solids concentration in the aeration tanks in 1966 was 2,600 ppm. The loading on the aeration section was 10 lbs. of BOD per 100 lbs. of mixed liquor suspended solids. This loading is still somewhat low. However, it is a substantial increase from the year 1965. This is probably due primarily to the increased concentration of the waste rather than the increased flow.

1000'S GALS SLUDGE TO DIGESTER



DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS		
	1000'S CU FT.	% SOLIDS	% VOL. MAT.	1000'S CU. FT.	% SOLIDS	% VOL. MAT.
JAN	9.15	3.98	3.03	-	-	-
FEB.	9.46	3.13	-	-	-	-
MAR.	10.16	4.59	3.04	-	4.16	-
APR.	13.94	4.95	3.90	1.60	5.43	2.79
MAY	17.90	4.98	-	-	-	-
JUNE	17.37	3.51	-	1.60	-	-
JULY	14.36	4.45	1.94	1.60	3.92	2.32
AUG.	13.78	-	-	-	-	-
SEPT.	10.58	3.35	2.52	-	6.92	3.67
OCT.	12.90	2.46	1.90	-	7.14	3.76
NOV.	13.48	3.34	2.43	-	6.33	3.41
DEC.	12.50	3.66	2.51	-	6.37	3.38
TOTAL	155.58	-	-	4.80	-	-
AVG.	12.97	3.85	2.66	0.40	5.75	3.22

COMMENTS

In 1966, a total of 155,000 cubic feet of sludge was removed from the waste and pumped to the digester for further treatment. From the digester a total of 4,800 cubic feet of sludge was pumped to the sludge drying beds for drying. The concentration of the raw sludge was 3.85 percent and the concentration of the solids in the digested sludge was 5.75 percent. These values are satisfactory ones for a well-operating digester.

Since the plant is not equipped with a gas meter, the sewage gas production cannot be recorded. However, it should be noted that a substantial amount of gas was produced at the plant which was utilized in the heating of the raw sludge and the plant buildings.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	14.028	-	-
FEBRUARY	15.168	-	-
MARCH	21.672	-	-
APRIL	14.707	-	-
MAY	13.267	* 425	3.42
JUNE	12.856	** 394	3.68
JULY	12.476	565	4.53
AUGUST	12.535	680	5.42
SEPTEMBER	15.923	578	3.63
OCTOBER	13.916	453	3.26
NOVEMBER	20.011	603	3.01
DECEMBER	20.140	*** 275	3.26
TOTAL	186.699	3973	-
AVERAGE	15.558	497	3.73

* 29 days chlorination

** 25 days chlorination

*** 13 days chlorination

COMMENTS

Chlorination is practised for effluent disinfection. In the past, this has been done only during the summer seasons from May 15 to October 15. In 1966, however, the Division of Sanitary Engineering of the OWRC instructed this Division to commence chlorination on a continual basis. This is presently being followed.

A chlorine dosage of 3.73 ppm was required to obtain the OWRC objective of a chlorine residual of 0.5 ppm after a 15-minute contact period.

LABORATORY LIBRARY



96936000118730

RECOMMENDATIONS

1. Efforts should be continued to eliminate storm water from the sanitary collection system.
2. Once the engineering study has been received and reviewed, the necessary recommendations should be initiated.

TD/227/K56/K56/1966/MOE
Ontario Water Resources Co
Kingston water
pollution control plant: atgu
1966 operating c.1 a aa
summary

Environment Ontario



Laboratory Library
125 Resources Rd.
Etobicoke, Ontario M9P 3V6
Canada

